

(21) Application No 9207617.3

(22) Date of filing 08.04.1992

(30) Priority data

(31) 9107444

(32) 09.04.1991

(33) GB

(71) Applicant

Swintex Limited

(Incorporated in the United Kingdom)

Derby Works, Manchester Road,
Bury, BL9 9NX, United Kingdom

(72) Inventors

Harry Vincent Houghton

Peter Wallwork

Michael Philip Booth

(74) Agent and/or Address for Service

Wilson, Gunn & Ellis

45-51 Royal Exchange, Cross Street,
Manchester, M2 7BD, United Kingdom(51) INT CL⁵

G02B 5/128, B32B 3/22 3/30 7/04, G09F 13/16

(52) UK CL (Edition K)

B5N N0322 N0330 N0704 N17X N17Y N170 N175
N176 N178 N180 N195 N196 N206 N207 N21Y
N223 N255 N257 N2730 N295 N297 N45X N46X
N478 N49X N49Y N501 N502 N504 N524 N537
N55X N564 N565 N566 N569 N57X N57Y N570
N571 N572 N58X N58Y N592 N593 N648 N658
N66Y N661 N665 N672 N70X N71Y N712 N728
N729 N764 N771
U1S S1127 S1147 S1859 S2281 S2286 S3037

(56) Documents cited

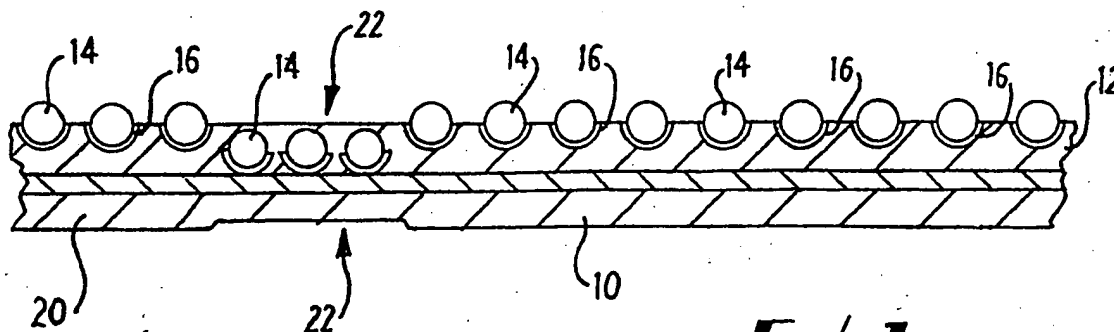
None

(58) Field of search

UK CL (Edition K) B5N, G5C CGAB
INT CL⁵ B32B, G02B, G09F
Online databases: WPI, CLAIMS

(54) Retro-reflective assembly

(57) A retro-reflective assembly has a base substrate (10) with an optional binder layer (12), in either of which a layer of partially metallised glass microspheres (14) is embedded. The substrate and/or binder layer is attached to a support (20) by means of a high frequency weld.

**FIG. 1**

1/1

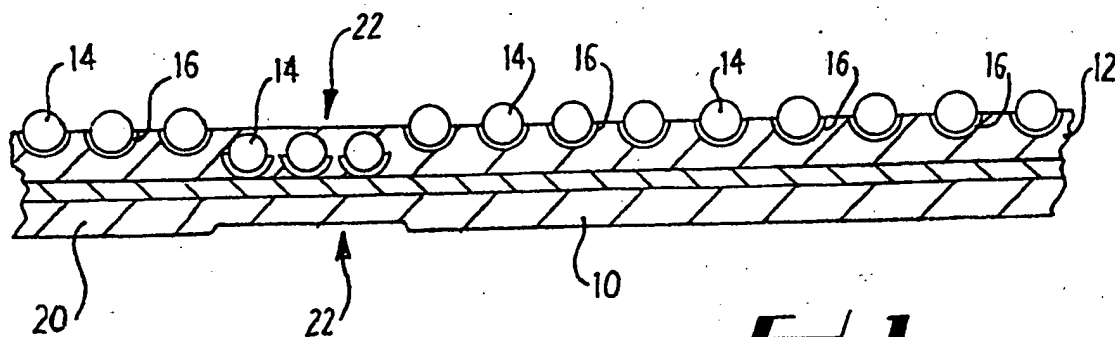


FIG. 1

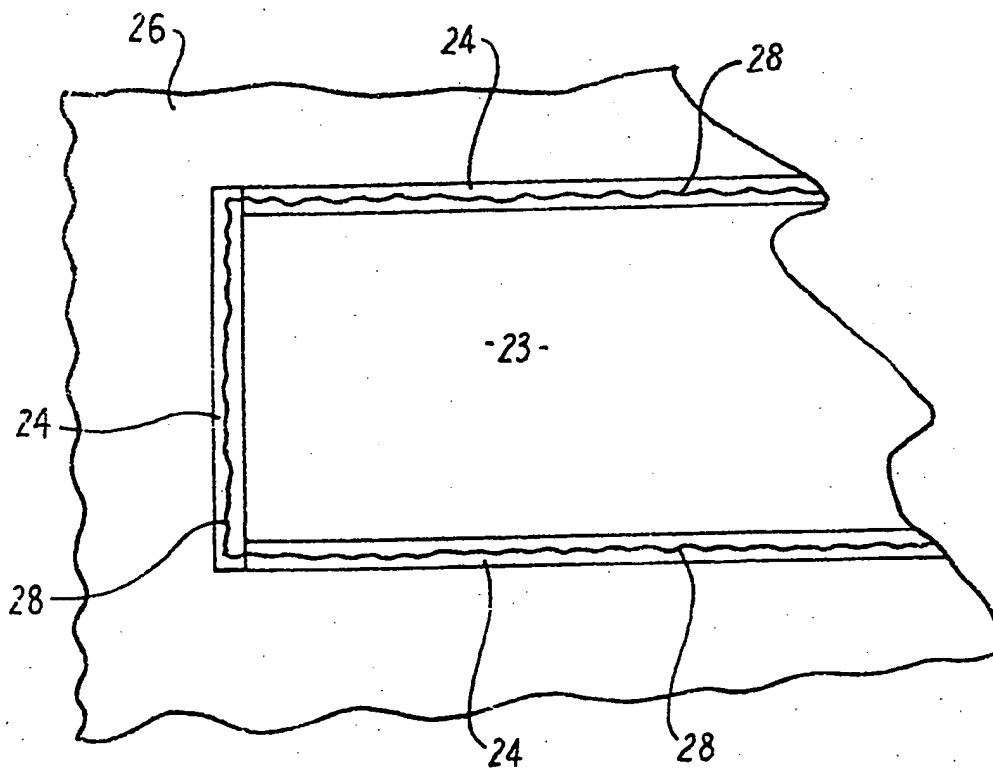


FIG. 2

RETRO-REFLECTIVE ASSEMBLY

This invention relates to retro-reflective assemblies and more particularly retro-reflective assemblies that are intended to be secured to a support.

Retro-reflective patches are now commonly fixed to articles of clothing so that the wearer can be identified in the dark. They are, for example, particularly helpful in this regard for the police cyclists, and other road users who wish to ensure that motorists will notice their presence at night time. Patches of retro-reflective material usually comprise a substrate on which a metal reflective layer is deposited. A binder layer is coated on to the metal layer and optical glass beads are partially embedded in the binder layer so as to contact the metal layer. In another arrangement the metal and binder layers may be combined together in the form of a binder layer having metal particles distributed therethrough. A transparent or translucent cover layer may extend over part or all of the assembly. Often the assembly is used without a cover layer. One of the problems with these kinds of assemblies is that they cannot be secured to a support surface by high frequency welding. This is because high frequency welding at sites where there is a metal reflective layer present causes shorting,

arcing or a minor explosion with possible consequent injury to the operator of the welding equipment and damage to the equipment itself and to the assembly being welded. The normal methods for fixing such patches to a substrate, therefore, is by means of adhesive, for example pressure sensitive adhesives or heat sensitive adhesive which enable the patch to be ironed on, or by means of stitching. Adhesives require an extra coating operation in the production of the assembly. Stitching is a relatively slow process. In addition since it involves penetration of the substrate to which the patch is to be secured it cannot always be used to fix patches to a substrate which is to be weatherproof.

The present invention has been made with these problems in mind.

According to a first aspect of the present invention there is provided a retro-reflective assembly comprising a base substrate, a layer of glass microspheres some or all of which are partially metallised and partially embedded in either the base substrate or a binder layer carried upon the base substrate; said substrate and/or binder layer being attached by means of a high frequency weld to a support.

According to a second aspect of the invention there is provided a retro-reflective assembly comprising a

base substrate, a layer of glass microspheres some or all of which are partially metallised and are partially embedded in either the base substrate or a binder layer carried on the base substrate; and a substantially transparent or translucent to light top cover which is attached by means of a high frequency welding method to the binder layer and/or the base substrate, the whole assembly being attached by means of a high frequency welding method via the top cover to a support.

According to a third aspect of the invention there is provided a retro-reflective assembly comprising a base substrate, a layer of glass microspheres some or all of which are partially metallised and are partially embedded in either the base substrate or a binder layer carried on the base substrate, said substrate and/or binder layer being attached by means of high frequency welding to a support, and a substantially transparent or translucent to light top cover attached to the support.

According to a fourth aspect of the invention there is provided a retro-reflective assembly comprising layers of materials that are capable of being welded together by means of high frequency radio energy not confined to but including the 27 megahertz waveband that has present, at a place where a welded join is effected, one or more partially metallised glass microbeads.

The invention rests on the surprising discovery that when the retro-reflective assembly includes metal coated optical glass beads instead of the conventional reflective metal layer high frequency welding can be carried out without the undesirable consequences of shorting, arcing and so on which occur when high frequency welding of prior art assemblies is attempted.

The major requirement for the invention to work satisfactorily is for the surfaces of the assembly and the support that are to be secured together to be weldable by high frequency welding. Polyvinyl chloride (PVC) is a material which is very easy to weld by high frequency welding. One or more of the base substrate, optional binder layer and the substantially translucent cover may be made of PVC and/or may be pigmented. Such pigmentation may be fluorescent.

In a preferred embodiment of the invention the binder layer of the retro-reflective assembly is coated on a substrate for example of polyvinyl chloride. A patch of the desired size is cut from the assembly and then welded by high frequency welding in the appropriate location on to the support.

The retro-reflective assembly can be covered with a transparent or translucent cover, for example of plastics material, which may be high frequency welded to

the substrate and/or the binder layer and/or a support, or the retro-reflective assembly may be used with the optical glass beads exposed. It is also possible to provide a cover over part of the assembly, for example around the edges of the assembly and which may be where the assembly is to be welded to the support.

The retro-reflective assembly may be over printed. One or more partially metallised glass microspheres may be partially or totally encapsulated at the point where welding together of layers of the assembly takes place and/or where the assembly as a whole is welded to a support.

The high frequency radio energy used may be in the 27 megahertz waveband. The retro-reflective assembly may form part of or comprise a road sign, article of clothing for human or animal safety or fashion, a fashion accessory such as a bag or backpack, a protective cover, sheet or tarpaulin, a warning tape or band, a collar, strap, belt or decorative or structural webbing, or patches or shapes attached to such items.

One or more of the layers of the retro-reflective assembly may be rigid or flexible. The substrate may be reinforced, for example by woven or non-woven textiles. The layer of partially metallised beads may include other particles and preferably covers between 5%

and 75% of the substrate surface area.

It is within the scope of the invention to weld the retro-reflective assembly as defined above to another like retro-reflective assembly so as to construct a complete item such as a garment.

Specific embodiments of the invention will now be described by way of example with reference to the accompanying drawings in which:-

Fig.1 is a section through a product produced by the method of the invention; and

Fig.2 is a plan view of a part of another product produced by the invention.

Referring to Fig.1 a retro-reflective assembly comprises a substrate 10, for example of polyvinyl chloride and a binder layer 12 coated onto the substrate. Optical glass beads 14 are partially embedded in the binder layer. The surfaces of the optical glass beads that are embedded in the binder layer are coated with a reflective metal 16.

The assembly is secured to a support 20 by high frequency welding. The site of the weld is indicated in the drawing by reference numeral 22. As can be seen

in the drawing the weld has been made at a location where metal coated optical glass beads are present.

In the embodiment of Fig.1 there is no cover over the optical glass beads. A transparent or translucent cover can be provided over a part or all of the assembly. In the embodiment of Fig.2 a retro-reflective assembly 23 of the kind described with reference to Fig.1 is provided with a strip of transparent or translucent covers 24 for example of polyvinyl chloride at its edges. The assembly is then high frequency welded to a support 26 along the edges of the assembly where the cover is positioned and as indicated by the line referenced 28.

The invention is not restricted to the above described embodiments and many variations and modifications can be made.

CLAIMS

1. A retro-reflective assembly comprising a base substrate, a layer of glass microspheres some or all of which are partially metallised and partially embedded in either the base substrate or a binder layer carried upon the base substrate; said substrate and/or binder layer being attached by means of a high frequency weld to a support.

2. A retro-reflective assembly as claimed in Claim 1 and comprising a substantially transparent or translucent to light top cover attached to the assembly by means of a high frequency radio energy weld to either or both the base substrate and/or the binder layer.

3. A retro-reflective assembly comprising a base substrate, a layer of glass microspheres some or all of which are partially metallised and are partially embedded in either the base substrate or a binder layer carried on the base substrate; and a substantially transparent or translucent to light top cover which is attached by means of a high frequency welding method to the binder layer and/or the base substrate, the whole assembly being attached by means of a high frequency welding method via the top cover to a support.

4. A retro-reflective assembly comprising a base

substrate, a layer of glass microspheres some or all of which are partially metallised and are partially embedded in either the base substrate or a binder layer carried on the base substrate, said substrate and/or binder layer being attached by means of high frequency welding to a support, and a substantially transparent or translucent to light top cover attached to the support.

5. A retro-reflective assembly as claimed in Claim 4, wherein the top cover is attached to the support by means of high frequency welding.

6. A retro-reflective assembly as claimed in any preceding claim, wherein the support comprises a retro-reflective assembly.

7. A retro-reflective assembly as claimed in any preceding claim, wherein one or more of the base substrate, the optional binder layer and the substantially transparent to light top cover comprise a layer or layers of PVC in their make up.

8. A retro-reflective assembly as claimed in any preceding claim, wherein any of the base substrate, the optional binder layer and the top cover are pigmented.

9. A retro-reflective assembly as claimed in Claim 8, wherein one or more pigment present is fluorescent.

10. A retro-reflective assembly as claimed in any preceding claim, wherein the assembly is over printed.

11. A retro-reflective assembly as claimed in any preceding claim, wherein at least one partially metallised glass microsphere is partially or totally encapsulated at the point where welding together of layers of the assembly takes place and/or where the assembly as a whole is welded to a support.

12. A retro-reflective assembly as claimed in any preceding claim, wherein the high frequency radio energy used is in the 27 megahertz wave band.

13. A retro-reflective assembly as claimed in any preceding claim, wherein the said assembly forms parts of or comprises a road sign, article of clothing for human or animal safety or fashion, a fashion accessory such as a bag or backpack, a protective cover, sheet or tarpaulin, a warning tape or band, a collar, strap, belt or decorative or structural webbing, or patches or shapes attached to such items.

14. A retro-reflective assembly comprising layers of materials that are capable of being welded together by means of high frequency radio energy not confined to but including the 27 megahertz waveband that has present, at a place where a welded join is effected, one or more

partially metallised glass microbeads.

15. A retro-reflective assembly as claimed in any preceding claim, wherein at least one of the layers is rigid.

16. A retro-reflective assembly as claimed in any of Claims 1 to 14, which is flexible.

17. A retro-reflective assembly as claimed in any preceding claim, wherein the substrate is reinforced, preferably by woven or non-woven textiles.

18. A retro-reflective assembly as claimed in any preceding claim, wherein the layer of partially metallised beads includes other particles.

19. A retro-reflective assembly as claimed in any preceding claim, wherein the layer of partially metallised beads covers less than 75% of the surface area of the substrate.

20. A retro-reflective assembly as claimed in any preceding claim, wherein the layer of partially metallised beads covers more than 5% of the surface area of the substrate.

21. A retro-reflective assembly substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

Section 17 (The Search Report)

Application number

9207617.3

Relevant Technical fields

- (i) UK CI (Edition K) B5N G5C
- (ii) Int CL (Edition 5) B32B, G02B, G09F

BEST AVAILABLE COPY

Search Examiner

R J MIRAMS

Databases (see over)

- (i) UK Patent Office
- (ii) ONLINE DATABASES: WPI, CLAIMS

Date of Search

24 JUNE 1992

Documents considered relevant following a search in respect of claims

1 TO 21

Category (see over)	Identity of document and relevant passages	Relevant to claim(s)
	NONE	

Category	Identity of document and relevant passages	Relevant to claim(s)
	BEST AVAILABLE COPY	

Categories of documents

X: Document indicating lack of novelty or of inventive step.

Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.

A: Document indicating technological background and/or state of the art.

P: Document published on or after the declared priority date but before the filing date of the present application.

E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.

&: Member of the same patent family, corresponding document.

Databases: The UK Patent Office database comprises classified collections of GB, EP, WO and US patent specifications as outlined periodically in the Official Journal (Patents). The on-line databases considered for search are also listed periodically in the Official Journal (Patents).